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Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

**“पुराने को छोड़ नये के तरफ”**

Jawaharlal Nehru

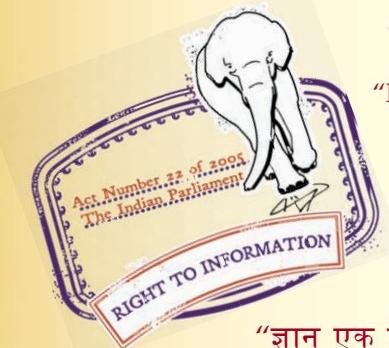
“Step Out From the Old to the New”

IS 10249-2-2 (1983): Voltage Dependent Resistors (Varistors), Part 2: Low Voltage, Section 2: Type VDS 1 [LITD 5: Semiconductor and Other Electronic Components and Devices]

**“ज्ञान से एक नये भारत का निर्माण”**

Satyanareshwar Gangaram Pitroda

“Invent a New India Using Knowledge”



**“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”**

Bhartṛhari—Nītiśākām

“Knowledge is such a treasure which cannot be stolen”





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Indian Standard



## SPECIFICATION FOR VOLTAGE DEPENDENT RESISTORS ( VARISTORS )

### PART 2 LOW VOLTAGE

#### Section 2 Type VDS 1

**0. General** — This standard ( Part 2/Sec 2 ) shall be read in conjunction with IS : 10249 ( Part 1 ) - 1982 'Voltage dependent resistors ( varistors ) : Part 1 General requirements and methods of tests'.

**1. Scope** — This standard covers the detail requirements for varistors, low voltage, disc type, non-insulated without terminations.

**2. Outline Drawing and Dimensions** — The outline drawing and dimensions shall be in accordance with Fig. 1 and Table 1.

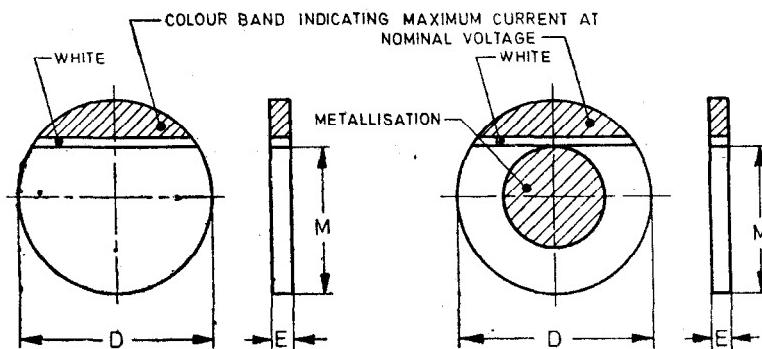


FIG. 1 OUTLINE DRAWING AND DIMENSIONS

TABLE 1 DIMENSIONS AND RATINGS

( Clauses 2 and 3 )

Sl No.	Style	Nominal Dissipation at 25°C(mW)	Nominal Voltage, V	Temperature Co-efficient percent/ $^{\circ}$ C, Max	Dimensions, mm		
					D	E	M (Min)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	VDS1-1	1000	48	0.8	17 ± 1	1.7 ± 0.4	14
ii)	VDS1-0.4	400	48	0.8	12 ± 1	1.7 ± 0.4	10
iii)	VDS1-0.25	250	48	0.8	10 ± 1	1.7 ± 0.4	7

**3. Ratings and Characteristics** — The electrical ratings and characteristics shall be specified in Tables 1 and 2.

#### 4. Environmental Classification

- a) Temperature severity 25/55/21
- b) Damp heat severity 21 days
- c) Air pressure ( low ) 1 kPa

**TABLE 2 RATINGS AND CHARACTERISTICS**  
( Clause 3 )

VDS1-1			VDS1-0·4			VDS1-0·25		
Colour band indicating maximum current at nominal voltage (mA)	Maximum current at nominal voltage (mA)	Current for efficiency test (mA)	Colour band indicating maximum current at nominal voltage (mA)	Maximum current at nominal voltage (mA)	Current for efficiency test (mA)	Colour band indicating maximum current at nominal voltage (mA)	Maximum current at nominal voltage (mA)	Current for efficiency test (mA)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Black	0·5	42	Black	0·5	27	—	—	—
Brown	0·9	76	Brown	0·9	44	—	—	—
Red	1·7	115	Red	1·7	65	Black	1·7	52
Orange	3·0	180	Orange	3·0	91	Brown	3·0	72
Yellow	5·0	268	Yellow	5·0	152	Red	5·0	121
Green	9·0	360	—	—	—	—	—	—
Blue	15·0	455	—	—	—	—	—	—

**5. Marking** — See 6 of IS : 10249 ( Part 1 ) - 1982.

**6. Material Construction and Workmanship** — See 4 of IS : 10249 ( Part 1 ) - 1982.

## 7. Tests

### 7.1 Classification of Tests

**7.1.1 Type Tests** — The sequence of type tests and grouping of samples for type approval shall be in accordance with Table 3.

**7.1.1.1 Number of samples** — The manufacturer shall submit 30 samples of the highest maximum current value and 30 samples of the lowest maximum current value in each style.

**TABLE 3 TYPE TESTS**

Group	Test	No. of Samples		CI Ref in IS : 10249 ( Part I )- 1982
		Lowest maximum current value	Highest maximum current value	
(1)	(2)	(3)	(4)	(5)
0	{ Visual examination Outline dimensions Current at nominal voltage	30	30	8.2.1.1 8.2.1.2 8.1.1
1	{ Rapid change of temperature Climatic sequence	4	4	8.3.5 8.3.1
2	Damp heat ( steady state )	4	4	8.3.2
3	{ Endurance ( Electrical ) Flammability	4	4	8.4.3 8.4.2
4	{ Overload Mould growth	4	4	8.1.4 8.3.3
5	Resistance to soldering heat	4	4	8.2.8
6	{ Efficiency Temperature co-efficient Salt mist test	4	4	8.4.5 8.1.5 8.3.4
7	Endurance operational	4	4	8.4.4
	Spares	2	2	

**7.1.2 Routine Tests** — Following tests shall constitute routine tests:

- a) Visual examination, and
- b) Current at nominal voltage.

**7.1.3 Acceptance Tests** — These tests shall be performed on the varistors that have passed the routine tests specified in 7.1.2. Two groups of samples ( Group A and Group B ) shall be selected and the varistors shall be subjected to the tests in the order given in Table 4.

TABLE 4 ACCEPTANCE TESTS

Sl No.	Test	CI Ref in IS : 10249 ( Part I ) -1982	AQL* ( Percent Defective )	Inspection Level	D/ND
(1)	(2)	(3)	(4)	(5)	(6)
i)	<i>Group A</i>				
	a) Outline dimensions	8.2.1.2	1	II	ND
ii)	<i>Group B</i>				
	<i>Sub-group B1</i>				
	a) Temperature coefficient	8.1.5	4	S <sub>3</sub>	ND
	b) Overload	8.1.4			
	<i>Sub-group B2</i>				
	a) Efficiency	8.4.5			
	b) Climatic sequence	8.3.1	4	S <sub>3</sub>	D
	<i>Sub-group B3</i>				
	a) Endurance ( electrical )	8.4.3	4	S <sub>3</sub>	ND

D = Destructive

ND = Non-destructive

\*See IS : 10673-1983 ' Sampling plans and procedures for inspection by attributes for electronic items ( under preparation ) '.

**Note 1** — Samples subjected to destructive tests and these having failed in non-destructive tests shall not be returned to the lot.

**Note 2** — For each group/sub-group separate samples shall be drawn.

**7.2 Methods of Tests** — The general test conditions and methods of measurements of the requirements shall be in accordance with IS : 10249 ( Part 1 ) - 1982.

**7.2.1** The test schedule with test conditions and requirements after each test applicable to varistors covered by this standard, shall be in accordance with Table 5.

TABLE 5 TEST SCHEDULE AND REQUIREMENTS

Sl No.	Test	CI Ref in IS : 10249 ( Part I ) -1982	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
I)	<i>All Samples</i>			
	a) Visual examination	8.2.1.1		The condition workmanship and finish shall be satisfactory. The markings shall remain legible and indelible
	b) Outline dimensions	8.2.1.2		The dimensions shall conform to the values given in Table 1 and Fig. 1
	c) Current at nominal voltage	8.1.1	Nominal voltage $48 \pm 0.1$ V	This shall not exceed the values specified in Table 2 for various styles
II)	<i>First Group</i>			
	a) Rapid change of temperature	8.3.5	25/55	—
	1) Visual examination	8.2.1.1		There shall be no fracture, loosening of parts or other mechanical deteriorations
	2) Current at nominal voltage	8.1.1		The change in current at nominal voltage shall not exceed $\pm 30$ percent

(Continued)

TABLE 5 TEST SCHEDULE AND REQUIREMENTS — Contd

Sl No.	Test	Cl Ref in IS : 10249 (Part I)-1982	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
b) Climatic sequence	8.3.1			
1) Temperature ( dry heat)	8.3.1.2	At maximum category temperature		
2) Damp heat ( cyclic)	8.3.1.3	One cycle		
3) Temperature ( cold)	8.3.1.4	At minimum category temperature		
4) Low air pressure ( Not applicable to varistors for ground applications )	8.3.1.5	For 1 h, during the last 5 minutes of the test, the specimens shall be loaded for 50 percent of the rated dissipation, subject to low air pressure voltage limitation		There shall be no breakdown or flashover
5) Damp heat ( cyclic)	8.3.1.6	Remaining cycles (One)		
i) Visual examination	8.2.1.1			There shall be no fracture, loosening of parts or other mechanical deterioration The markings shall remain legible and indelible
ii) Current at nominal voltage	8.1.1			The change in current at nominal voltage shall not exceed $\pm 30$ percent
III) Second Group				
a) Damp heat ( steady state )	8.3.2	21 days		
1) Working Test		Within 15 minutes after removal from the chamber. The specimens shall be loaded for rated dissipation for 1 minute		There shall be no breakdown or flashover
2) Visual examination	8.2.1.1			There shall be no fracture, loosening or parts or other mechanical deterioration The markings shall remain legible and indelible
3) Current at nominal voltage	8.1.1			The change in current at nominal voltage shall not exceed $\pm 30$ percent
IV) Third Group				
a) Endurance ( electrical )	8.4.3			
1) Intermediate measurements	8.4.3.1	At the end of 1 h off period and a recovery period of 4 h $\pm 30$ minutes		
i) Visual examination	8.2.1.1			There shall be no fracture, loosening of parts or other mechanical deterioration. The markings shall remain legible and indelible
ii) Current at nominal voltage	8.1.1			The change in current at nominal voltage shall not exceed $\pm 20$ percent
2) Final measurements	8.4.3.2			
i) Visual examination	8.2.1.1			There shall be no fracture, loosening of parts or other mechanical deterioration. The markings shall remain legible and indelible
ii) Current at nominal voltage	8.1.1			The change in current at nominal voltage shall not exceed $\pm 20$ percent
iii) Efficiency	8.4.5			The maximum voltage measured across the terminals of the varistor during the test shall not exceed the value specified in Sl No. (vii) (a)

(Continued)

**TABLE 5 TEST SCHEDULE AND REQUIREMENTS — *Contd***

<b>SI No.</b>	<b>Test</b>	<b>Clause Ref in IS : 10249 ( Part I )-1982</b>	<b>Condition of Test</b>	<b>Requirement</b>
(1)	(2)	(3)	(4)	(5)
b) Flammability		8.4.2		As specified in IS : *
V) <i>Fourth Group</i>				
a) Overload		8.1.4		
1) Visual examination		8.2.1.1		There shall be no fracture, loosening of parts or other mechanical deterioration. The markings shall remain legible and indelible
2) Current at nominal voltage		8.1.1		The change in current at nominal voltage shall not exceed $\pm 10$ percent
b) Mould growth		8.3.3		The requirements shall be as specified in IS : 9000 ( Part 10 ) - 1979†
VI) <i>Fifth Group</i>				
a) Resistance to soldering heat		8.2.8		
1) Visual examination		8.2.1.1		There shall be no fracture, loosening of parts or other mechanical deterioration. The markings shall remain legible and indelible
2) Current at nominal voltage		8.1.1		The change in current at nominal voltage shall not exceed $\pm 5$ percent
VII) <i>Sixth Group</i>				
a) Efficiency		8.4.5		The maximum voltage shall not exceed 145 V
b) Temperature co-efficient		8.1.5	Procedure I to be followed	0.8 percent/deg C ( Maximum )
c) Salt mist test		8.3.4		
1) Visual examination		8.2.1.1		There shall be no corrosion or loosening of parts or other mechanical deterioration. The markings shall remain legible and indelible
VIII) <i>Seventh Group</i>				
a) Endurance operational				
1) Visual examination		8.2.1.1		There shall be no fracture, loosening of parts or other mechanical deterioration. The markings shall remain legible and indelible
2) Current at nominal voltage		8.1.1		The change in current at nominal voltage shall not exceed $\pm 20$ percent
3) Efficiency		8.4.5		The maximum voltage measured across the terminals of the varistor during the test shall not exceed the value specified in SI No. (vii) (a).

\*Fire hazard testing, Part 2 Test methods, glow wire test and guidance (*under preparation*).

†Mould growth test.

**EXPLANATORY NOTE**

While preparing this standard, assistance has been derived from the JSS 50651, issued by Ministry of Defence, India.